ELECTRO DIAGNOSIS

Date 22/8/21
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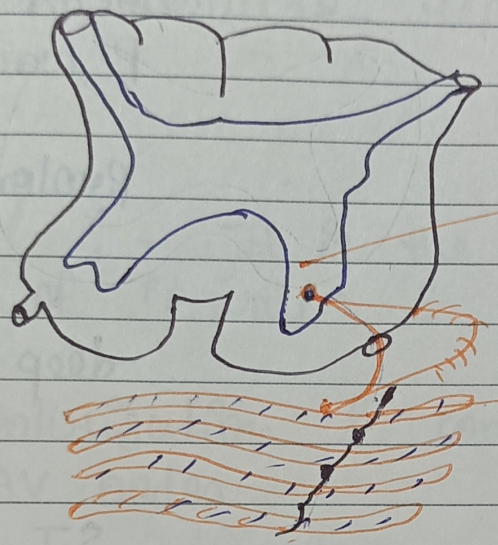
1) EMG [electro myography] :- EMG is a term used in studying the electrical activity of the muscles for the diagnosis of neuromuscular disease.

* Principal :-



→ A motor unit compuises of an anterior horn cell the axon arising from it, it's neuromuscular junction and the muscle fiber with the axon innervates.

→ The electrical activity produce by the individual muscle fibers is sumed-up because they reched the electrode simultaneously. The electrode recordes all the potential reaching them without diffarcieting their origin.

* Indication of clinical EMG :-

1) neuropyraxia :-
2) axontemasis.
3) neurotemasis.
4) polyneuropathy.
5) motor neuron disease.

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EMG basic components :- include specialized intramuscular recording electrodes, a preamplifier, amplifier & displays. display are usually both visual & auditary, using the CRO & a loudspeaker, respectively.

- Psyncom
- poliomyelities.
- amyotropic lateral sclarosis [ALS]
- progressive muscular atrophy.
- muscular bulbar palsy.
- spinal muscular atrophies.
- myopathies.
- MG [myasthenia gravis].
- radiculopathy.
- spinal cord compression.
- cervical spondylosis.
- lumber ~~dectation~~. disclination.
- facial nerve palsy.
- movement disorder.

* Types of EMG :- These are 4 types.

i) Clinical EMG (needle) EMG.
ii) Kinesfologic / Surface) EMG.
iii) Single fiber EMG.
iv) Macro EMG.

1) Clinical EMG / needle :- (study in neuromuscular junction)
In clinic EMG electrical activity of a muscle is studied by in certain a recording electrode into it.

→ The motor unit action potential [MUAP] picked up by the electrodes is display on an oscilloscope for visual analysis or acoustically mointored through a loud speaker system.

* Technique :-

1. The skin over the areas to be tested in cleaned

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Interference pattern :- the EMG interference pattern, built up of single motor unit action potentials, may be analyzed subjectively or objectively by computer aided, quantitative method, like counting of zero-crossings, counting of spikes, amplitude measurements, decomposition, integration of the area under the curve, teng. power.

with anticeptic solution.

2. And electrode that combines the reference point & a needle for recording is inserted into a

3. Specific muscle to be tested and other end is attached by wires to the recording machine.

4. Then the examiner asked the pt gradually the force & while the electrical activity in the muscle is ~~begin~~ being recorded.

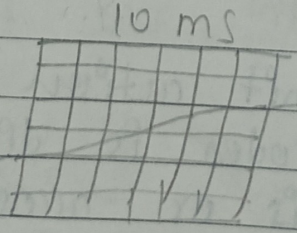
5. The electrical activity in the muscle is display as waving & spiky lines. on a special video monitor.

spiky

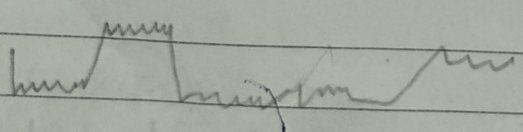
6. An EMG is teng. may take ~~20~~ 30 to 60 min.

* ~~Equipment~~ Setup :- Equipment

low frequency filter = 10 - 30 Hz.
High frequency filter = 10 - 20 KHz.
sweep speed = 5 - 10 ms / division.
Amplifier sensitivity = 50 - 100 μV / division.



Resting



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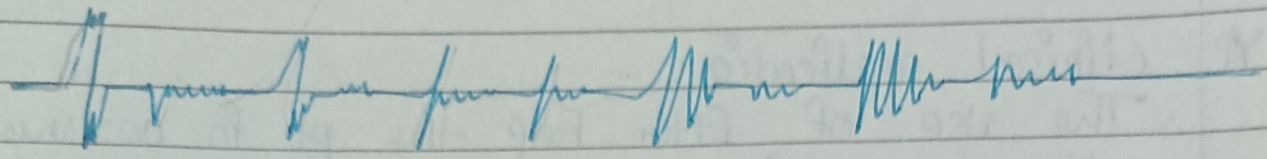
* Fibrilation :- potential are spontaneously occuring action potential from a single muscle fiber.

→ These occurs in the presence of impaired innervation. The 'denervated muscle' gives spontaneous discharge because they hypersensitive to the circulating Ach.



amplitude - 20 - 1000 uv.
duration - 1-5 ms.
frequency - 0.5 - 15 Hz.

Sound - high pitch sound (rain drop falling on tin roof).

* Causes :-
1. ant. horn cell lession (poliomyelitis).
2. radiculopathy.
3. axonal neuronal pathies.
4. plaxopathies.
5. entrapment neuropathies.
6. muscular dystrophy.

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ii) Kinesiologic / Surface EMG :- This type of EMG is use for studing muscle activity & help in stabilising the role of different muscles for specific activity.

Indication
Condition :- ① functional movement performance MMT
② passive movement.

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③ gait.
④ PNF.

* Pattern of muscle response :-
i) Types of muscle contraction.
ii) ~~contraction~~ position.
iii) onset & cessation of activity.

* Clinical application -
The use of EMG help the pt in assesment as well as planning the tlt as it's provide the information about the effectivness of the specific ~~posture~~ procedure.

vi) Single fiber EMG [SFEMG] :- Single fiber EMG is method of recording action potential of a single muscle fiber extra cellular within the same motor unit

→ This teng. a single fiber neddle is inserted by a steel ~~c~~anula during a slide voluntary contraction & the recording is taken from a single side.

* Indication -
1) neuromuscular transmission disorder.
2) myopathy.
3) motor neuron disease.

vs: myopathy

vii) Macro EMG :- Is a teng. of recording action potential of the entire motor unit
In this teng. macros electrode are used which have ≥ 0.55 mm diameter steel canula apply.
* Indication - myopathy

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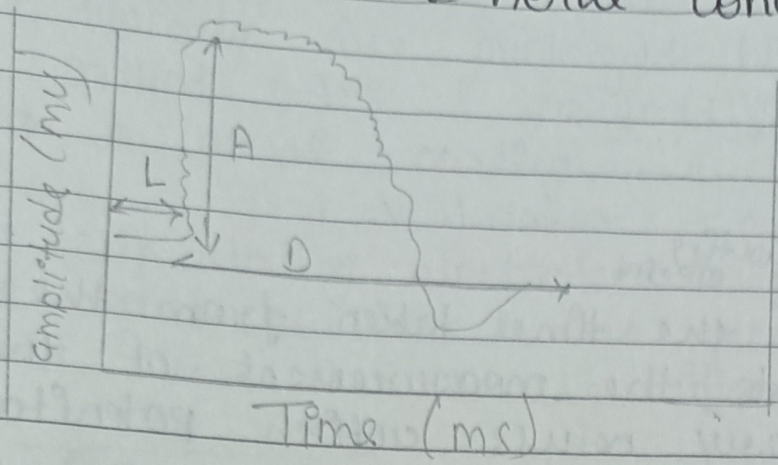
* Indication NCV [nerve conduction velocity]

A)



L - Latency
A - amplitude
D - Duration.

- Nerve conduction study the recording teng. of a phenipheral nerve impulses it's some location which may be distant from the side from where the propagating action potential is induced in that peripheral nerve.

→ In this teng. nerve conduction velocites are measured blw 2 side that are stimulated or blw a stimulus & a recording side.

→ In other words NCS is used to measure the action potential resulting from phenipheral nerve stimulation

→ which can be recorded over the nerve or innervated muscle.

response of potential

* Principal :-

i) action potential :- The action potential is a summation of multiple potential.

2) latency - The letency is defined as the time interval blw the onset of stimulus & the onset of response.

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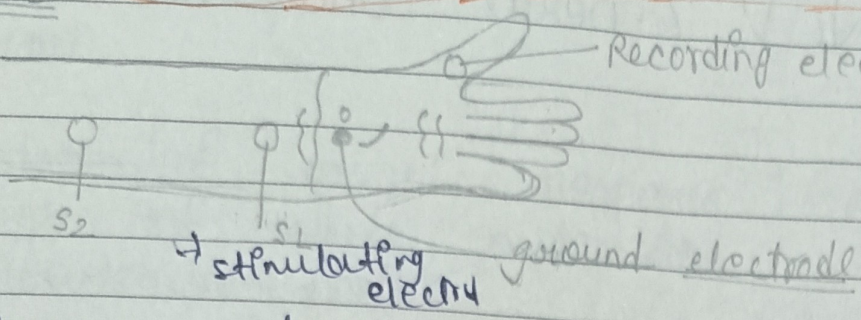
the mid line.
→ popliteal fossa slightly lateral
→ 1msec duration is used for preferential stimulation of sensory fiber. And 1milsec duration is used for motor fiber.
→ atlest 5 'H response should be study for analysis. below

B) hand



→ It represent the time taken from the stimulation of a nerve to the measurement of the beginning of the sensory nerve action potential.

3) Conduction velocity - is the speed of propagation of an action potential along a nerve it can be calculated by -

$$\text{Conduction velocity} = \frac{\text{conduction distance}}{\text{conduction time}}$$

normal conduction velocity NCV average above 50 m/sec. in the upper extrinity & above 40 m/sec in the lower extrinity.

4) Amplitude - The maximum hight of the A.p is the amplitude

5) Duration - is the time from departure from the base line to the final return to the base line.

* Technquine :- (dig B) seen)

1. In this test the surface electrode are used most commonly but neddle electrode may be used sum special stuation situation.

→ The electrode are attached to the skin with

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feet should hang freely with dorsum right
* electrode placement :- The active surface el- is placed at the distal edges of the calf muscle (recording el-) & the reference el- tw Achillas tendon. The ground el- is placed blw active el- & the stimulation side. or

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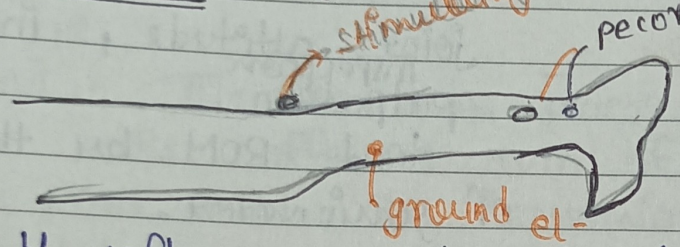
special adhesive tape. The stimulating electrode are typically are prolonged bipolar electrode with the cathode (-)ve & anode (+)ve extanding out from a plastic casting.

→ The stimulating electrodes is placed directly over the nerve studies & the recording electrode is placed over the muscle innerved by that nerve.

→ The 'ground el-' is placed blw the stimulating & recording el-.

2nd

* 'H Reflex' :-



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The H reflex was describe by 'HOFFMAN' in 1918 & hance it was named H reflex.

→ It is a monosynaptic reflex elicited by ~~some~~ sub maximal stimulation of the tibial nerve & is recorded calf muscle.

→ ~~eff~~ efferent motor fiber supplying the muscle the H-reflex does not include muscle spindle activation.

* Recording teng. :- The H reflex is sensitive so it can be affected by no. of variables.

→ The latency of H reflex is depanded on the age & leg length of the pt.

→ over the age of 60 years the H-reflex often absent.

• pt position - pt should be reclying (prone) comfortable.

~ with leg & thigh supported.

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